(12) UK Patent Application (19) GB (11) 2 248 215 (13) A

(43) Date of A publication 01.04.1992

(21) Application No 9102454.7

(22) Date of filing 05.02.1991

(30) Priority data
(31) 9019791 (32) 11.09.1990 (33) GB

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(51) INT CL[5]
B64F 1/22

(52) UK CL (Edition K)
B7H HA H606 H741 H755

(56) Documents cited
GB 1105364 A GB 0551605 A US 3662911 A

(58) Field of search
UK CL (Edition K) B7H HA
INT CL[5] B64F 1/22

# (54) Aircraft ground-handling dolly

(57) The dolly, especially for the movement of light aircraft, has a chassis supported by wheels 14, 14a on two longitudinally-spaced axles, wheels 14 being driven by an electric motor powered by a battery in housing 20. The dolly has a cradle 29-33 for supporting the aircraft wheel 36 and the chassis is lowerable to the ground between the axles, e.g. by being hinged at 12, for engagement and disengagement of the aircraft wheel 36. Thus the weight of the aircraft assists traction. The dolly is manually steering by handle 21.

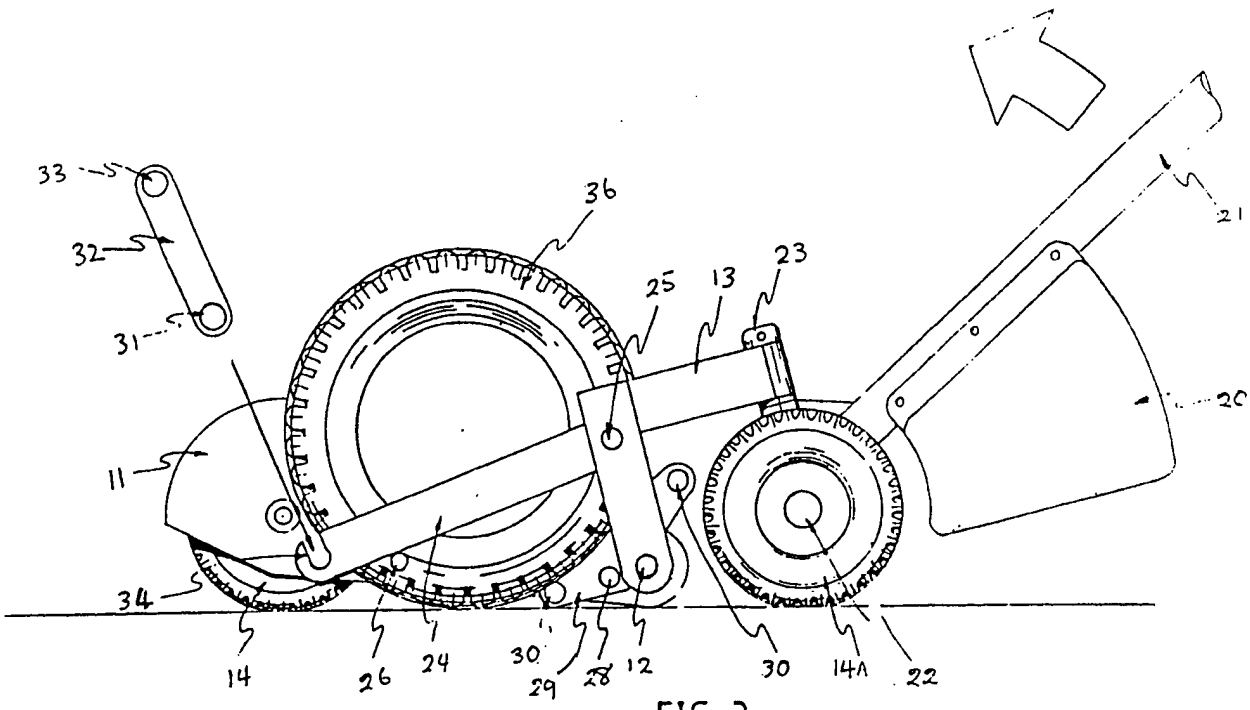


FIG. 3

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.



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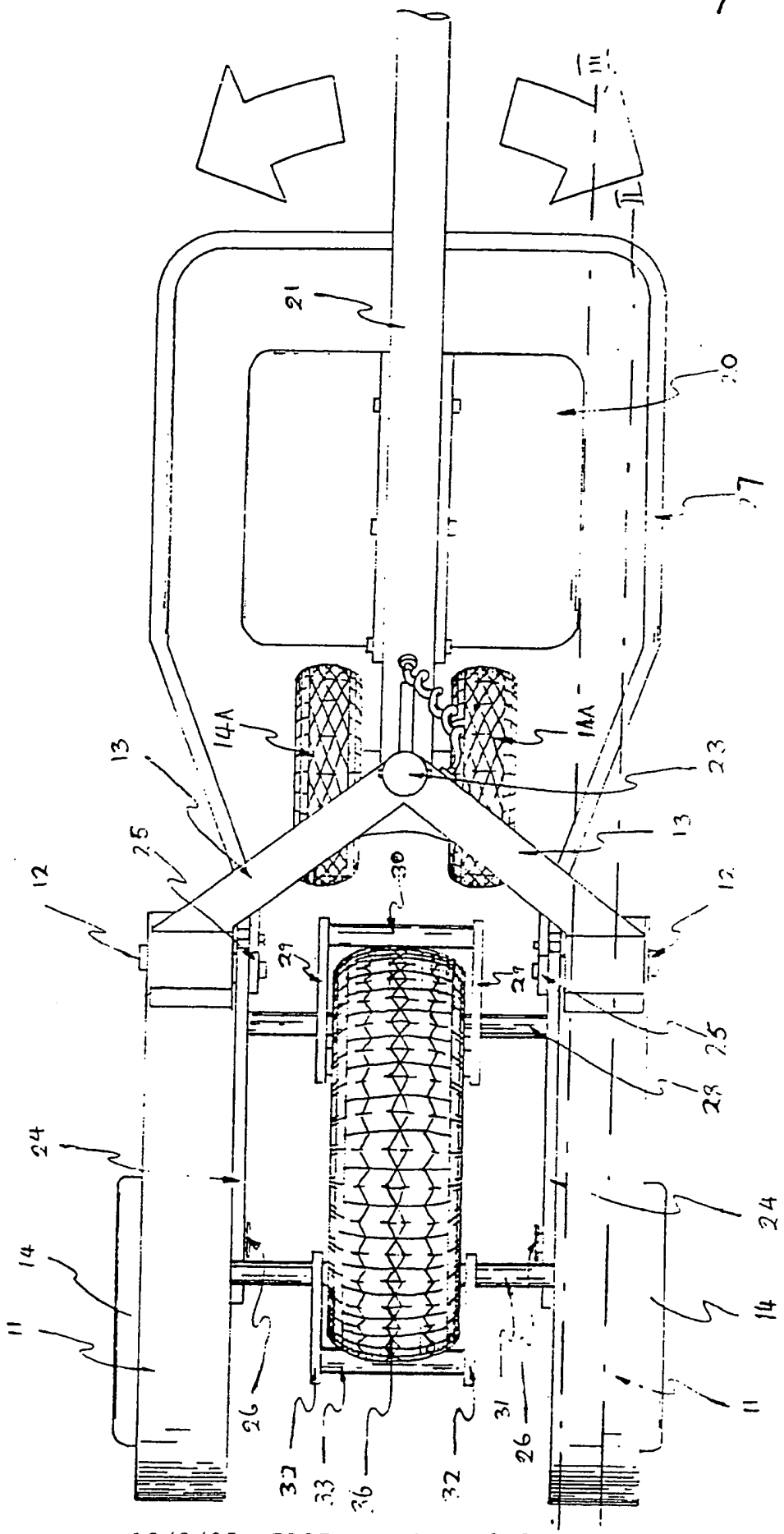
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FIG. 1

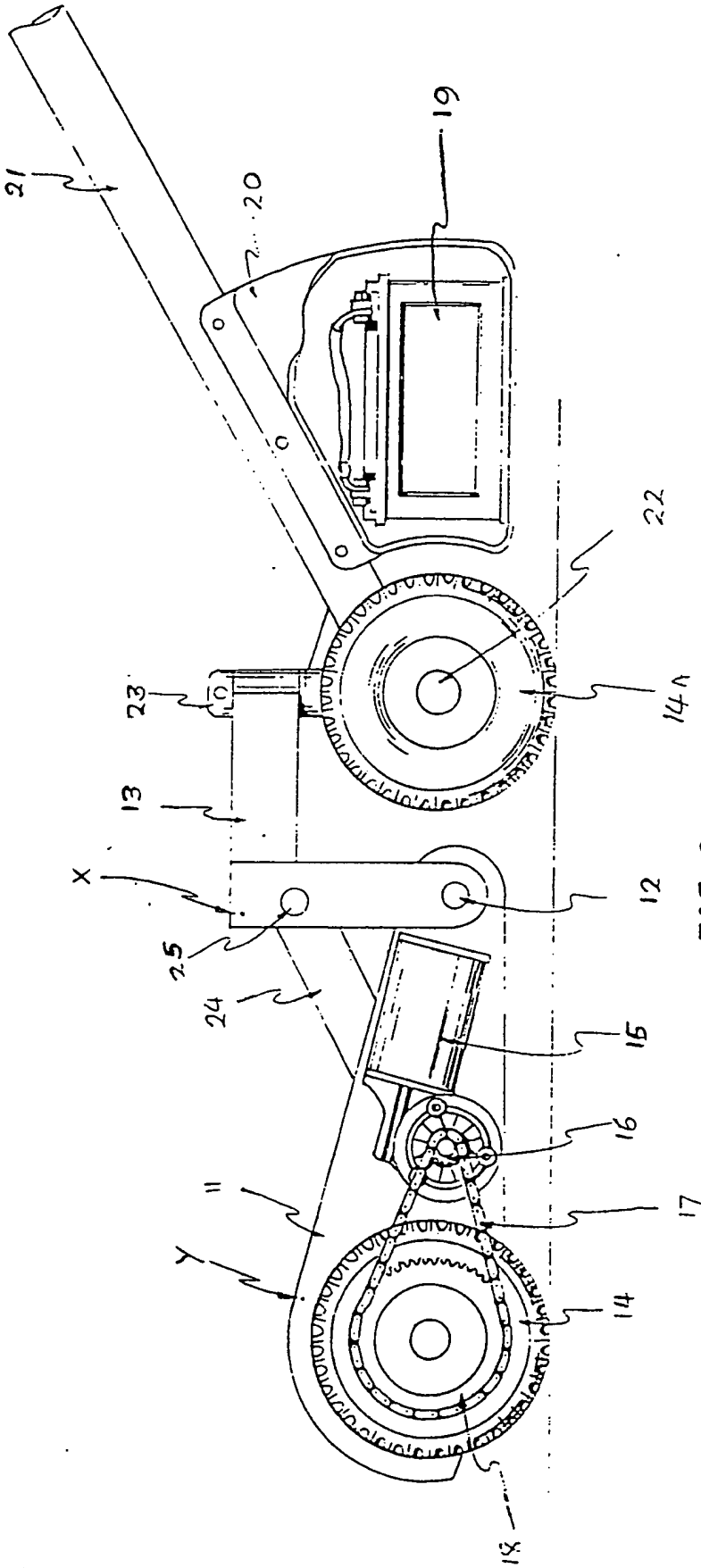



FIG. 2

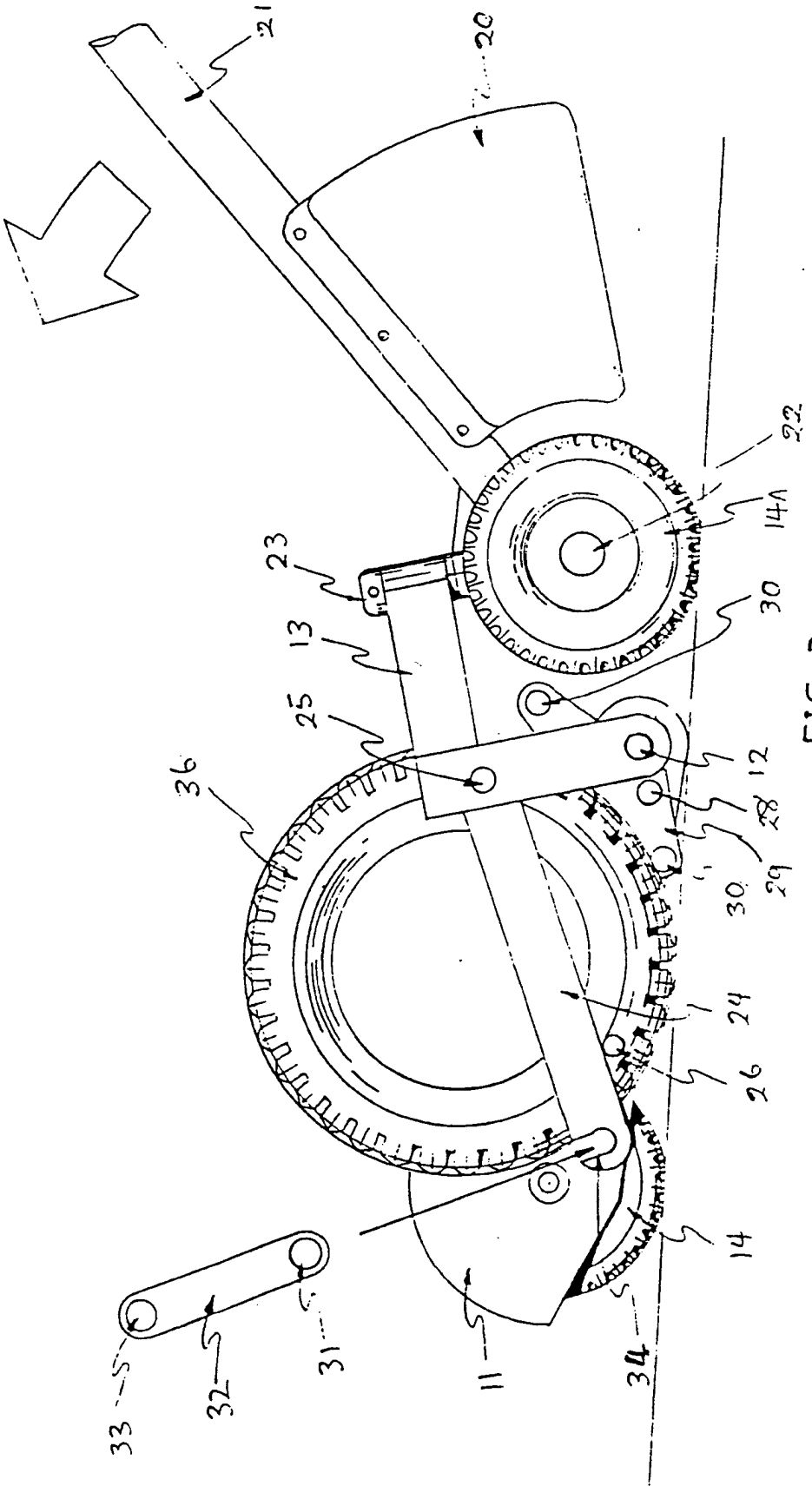



FIG. 3

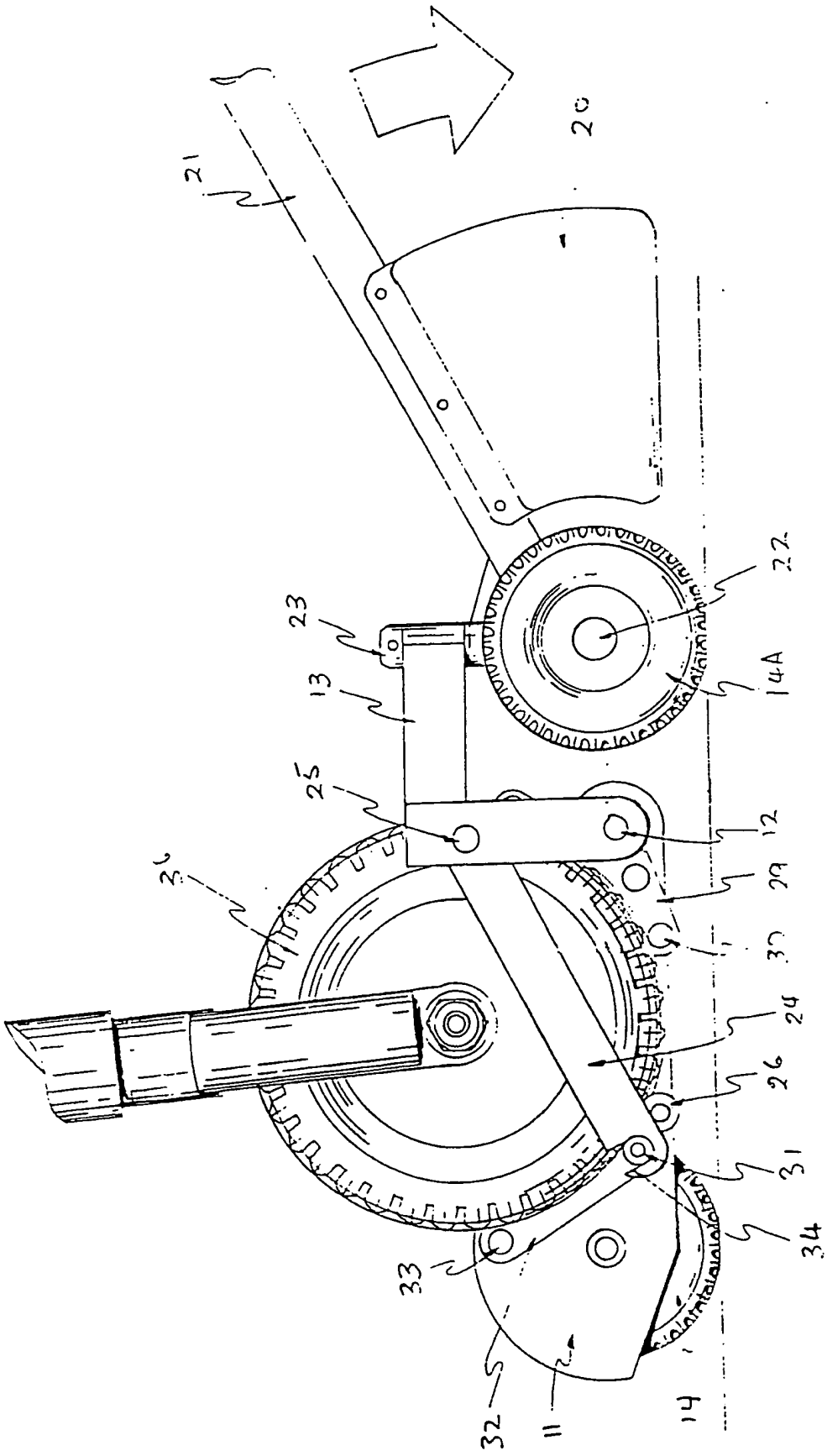



FIG. 4

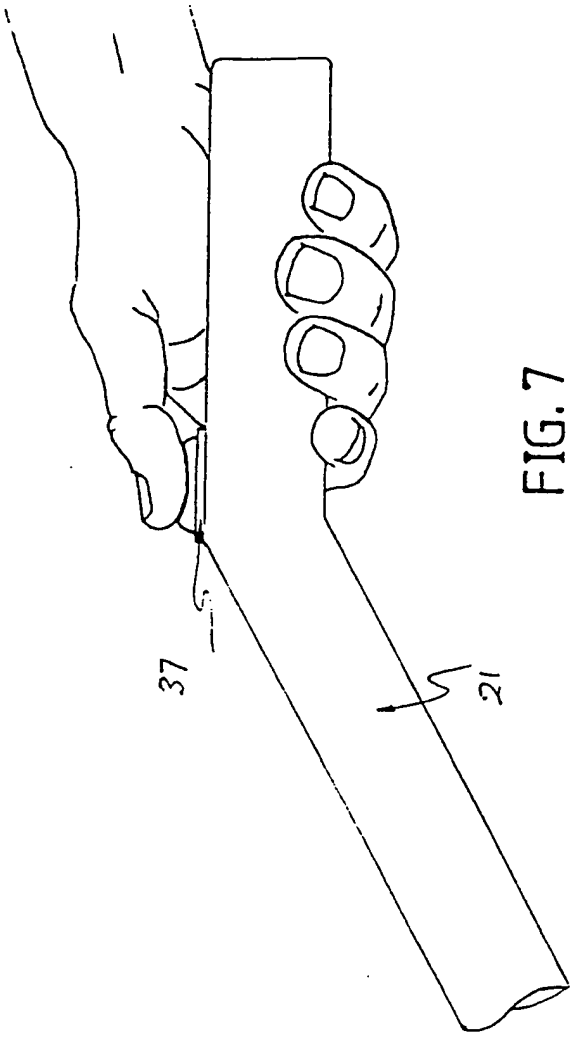



FIG. 7

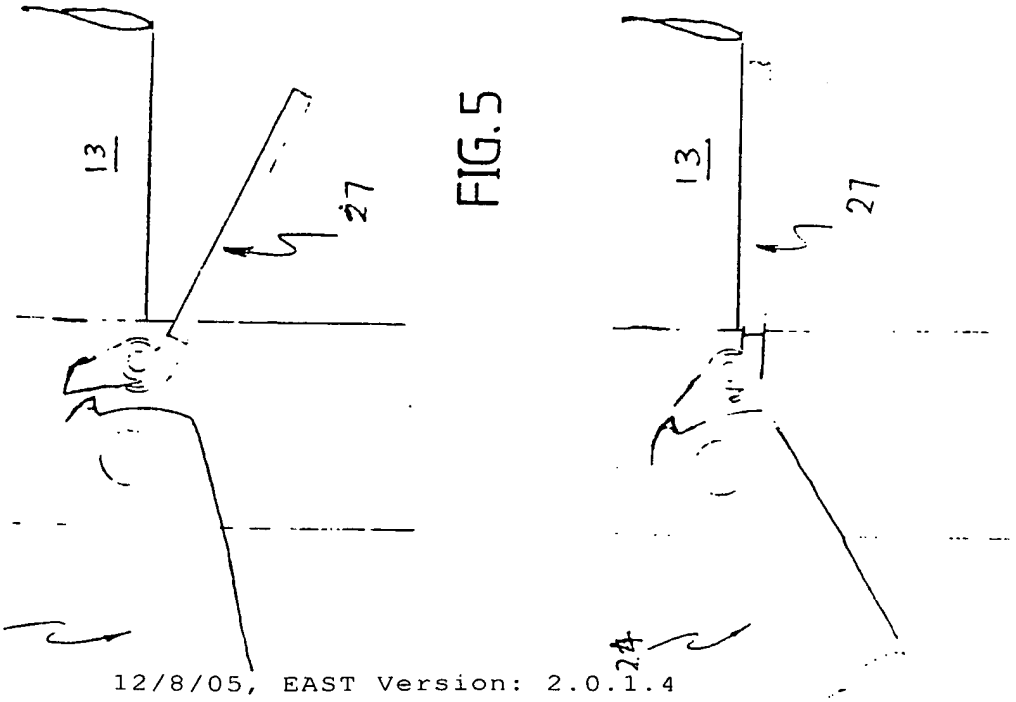



FIG. 5

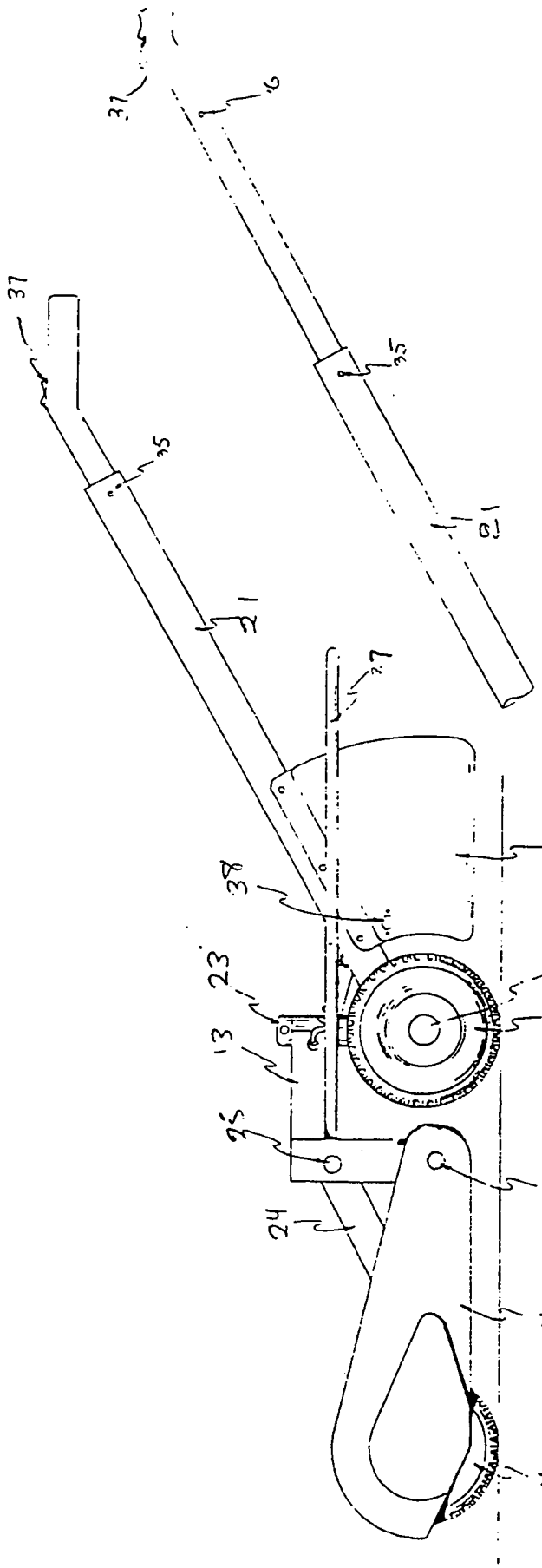



FIG. 6

FIG. 8

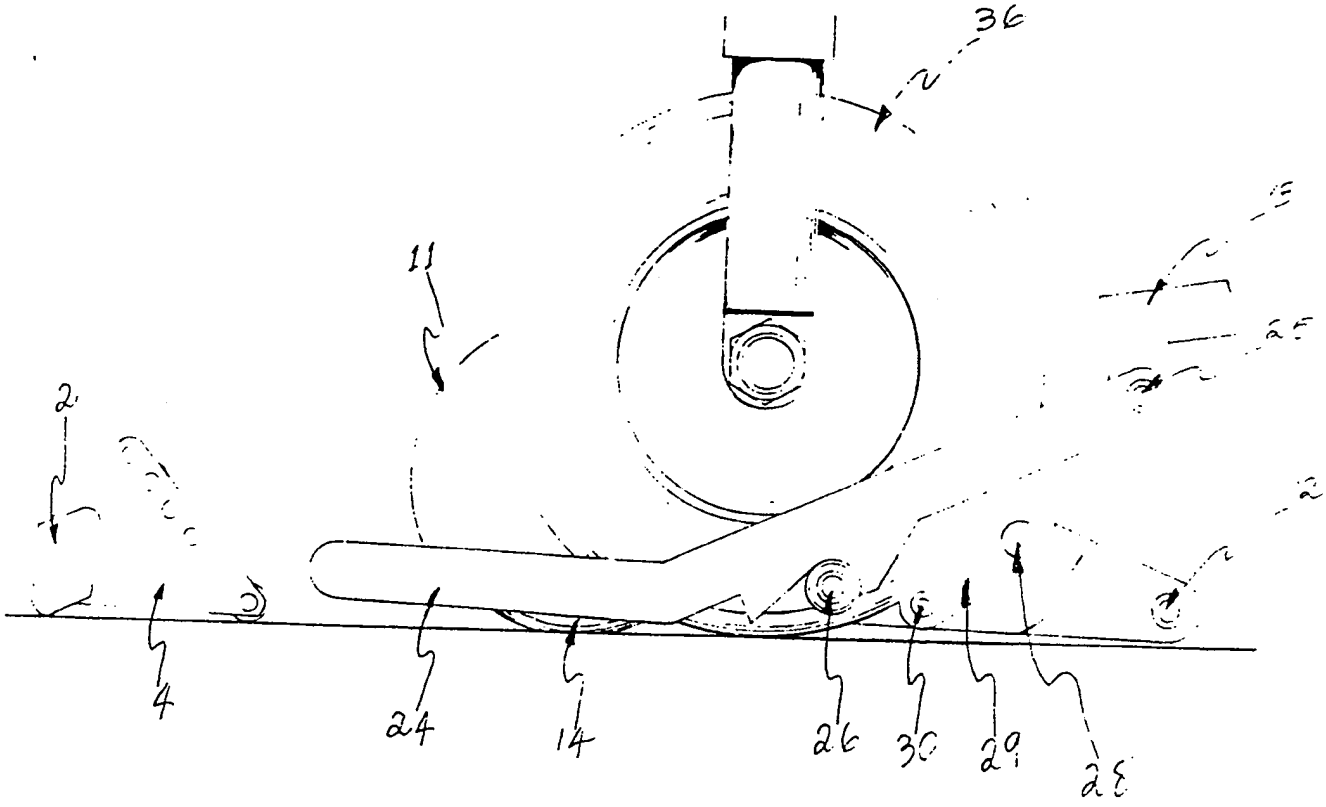



FIG. 9

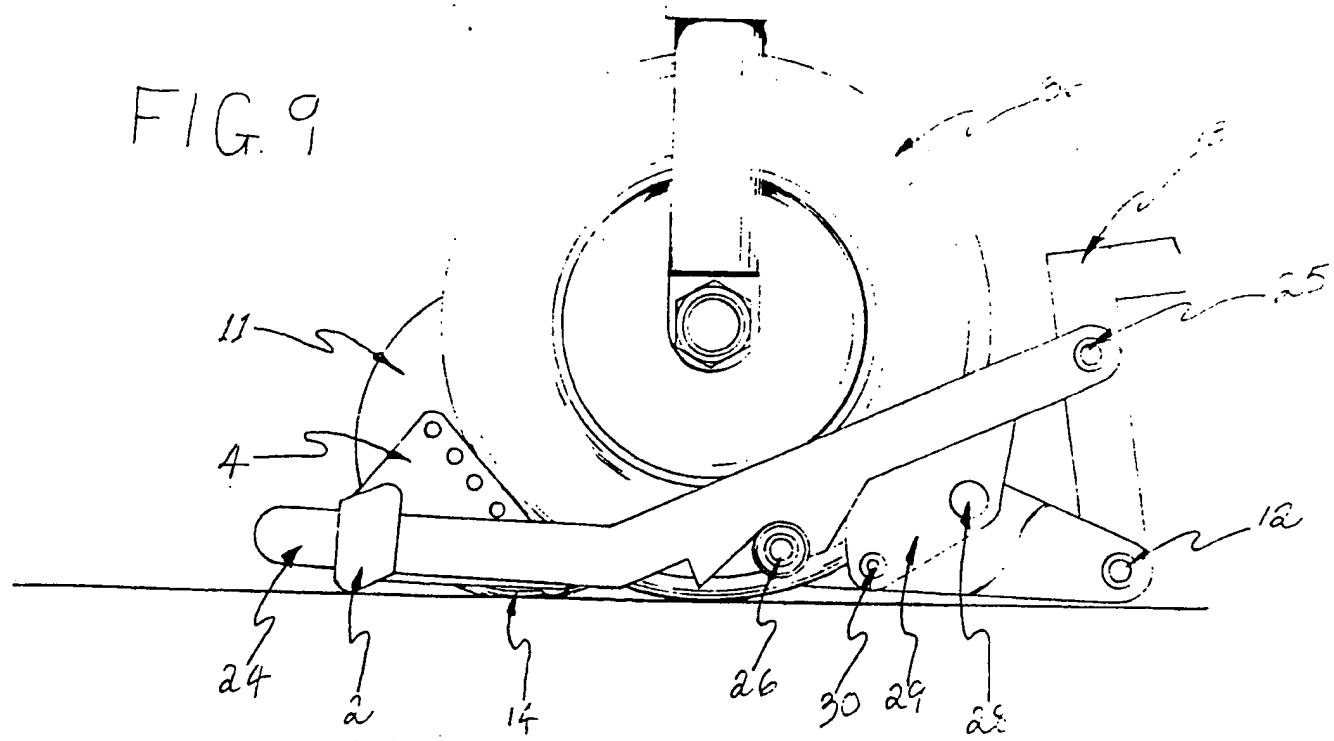
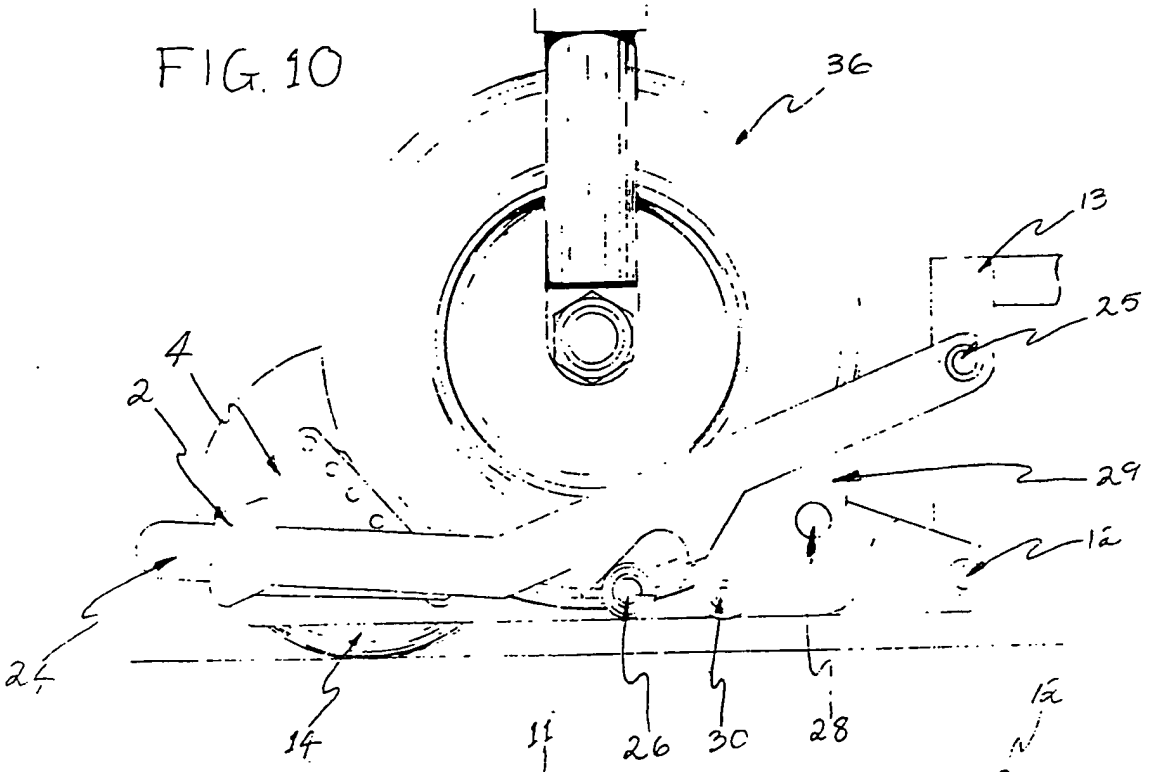


FIG. 10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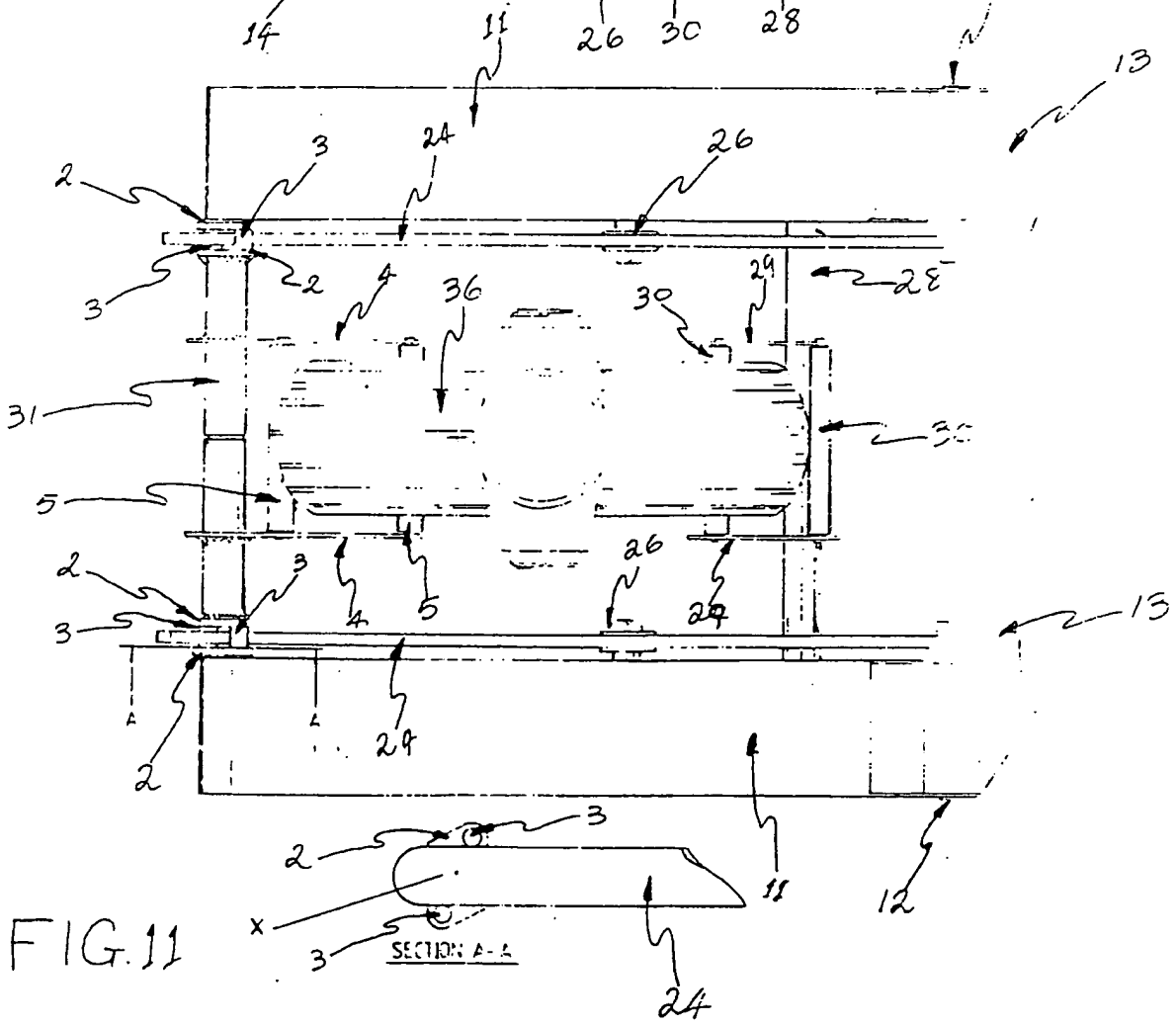
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SECTION A-A
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FIG. 11

# MOVEMENT OF AIRCRAFT

This invention relates to the ground movement of aircraft or of automobiles, heavy trailers and the like.

The movement of aircraft, especially light aircraft, presents difficulties particularly for individuals and particularly in confined areas such as an aircraft hangar or parking area. Not only is the weight considerable but there is the problem of manoeuvring while avoiding other aircraft, walls, doors and so on. Larger aircraft, on the other hand, are generally moved by means of purpose-built towing tractors which have sufficient weight to afford enough traction to pull or push large loads without wheel-slip. Such tractors, even small ones, are impractical for light aircraft and a small tractor would have insufficient weight to avoid wheel-slip when exerting the required tractive force.

It is an object of the present invention to provide a self-propelled device for the ground movement of for example light aircraft, on a hard or grass surface, which avoids the disadvantages referred to above.

According to the invention, a self-propelled dolly for the movement of aircraft comprises a chassis supported by wheel means carried on two longitudinally-spaced axles, the chassis including aircraft wheel support means between the axles and the chassis being lowerable between the axles to a ground-contacting position for engagement and disengagement of an aircraft wheel, at least one wheel means being motor-drivable.

In the use of a dolly according to the invention, the

weight of the aircraft (or other load) provides the downward-acting force which enables sufficient friction to be developed between the wheel means and the ground to avoid wheel-slip.

Preferably, the wheel means are circular and equipped with pneumatic tyres although tracked wheels could be used on at least one axle. Desirably, the dolly is steerable, for example by constructing and arranging for one axle to be pivotable about a vertical axis with respect to the other axle.

The chassis may be constructed in two parts pivoted together about a horizontal axis between the axles and including releasable locking means to maintain the chassis in the raised or load-carrying position except when required to be lowered for engagement and disengagement of an aircraft wheel, which will generally be a nose-wheel but may, depending on the wheel configuration of the aircraft, be a tail-wheel.

In a preferred arrangement, a dolly according to the invention comprises:

a pair of laterally spaced apart first ground-engaging wheels each mounted about a portion of a split first axle on a bifurcated chassis portion, the wheels defining therebetween a space to receive an aircraft wheel; one or more second ground-engaging wheels mounted on a second chassis portion and pivotable about a substantially vertical axis to provide steering ability to the dolly, the second chassis portion including handle means extending therefrom for control of the dolly by an operator; a motor and drive means operatively connected to at least one of said

ground-engaging wheels; pivot means pivotably connecting together at distal ends thereof with respect to and between said first and second ground-engaging wheels about a substantially horizontal axis said chassis portions, whereby said distal ends are lowerable and raisable with respect to the ground; means to support an aircraft wheel mounted on said bifurcated chassis portion; and releasable locking means to maintain said distal ends in the raised position, in which an aircraft with a wheel thereof supported above ground level by the dolly may be manoeuvred.

Preferably, the support means comprises a fixed wheel cradle mounted between the bifurcated chassis sections towards the distal end thereof, and a movable cradle mounted or mountable between the bifurcated chassis sections towards the proximal end thereof, whereby the bifurcated sections may be placed on either side of an aircraft wheel with the wheel on one side of the ground-contacting part in contact with the fixed cradle, and the movable cradle may then be located on the other side of the ground-contacting part so that the wheel is evenly supportable about its central bearing on raising the bifurcated portion from the engagement/disengagement to the load-carrying position.

The releasable locking means may comprise bracing elements which extend between a fixed pivotal position on the second chassis portion and a slidable position on the bifurcated chassis portion, a pawl and ratchet or other mechanical locking means being provided at the pivotal position to engage automatically when the distal ends of the chassis portions are in the raised position, to prevent return to the lowered position

until the pawl and ratchet are disengaged. The movable cradle may be mountable on the lower ends of the bracing elements which thereby also play a part in supporting the aircraft wheel. As an alternative to the bracing elements, a hydraulic piston and cylinder may be mounted between the respective chassis portions to control raising and lowering thereof.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawigns, of which

Figure 1 is a plan view of an inventive dolly with an aircraft wheel in position;

Figure 2 is a partly cut-away side view of the dolly in the unloaded condition on the line II-II of Figure 1;

Figure 3 is another partly cut-away side view of the dolly, along the line III-III of Figure 1, in the wheel-engaging position;

Figure 4 is a similar view to Figure 3, in the load-carrying position;

Figure 5 shows a detail of a pawl and ratchet releasable locking mechanism;

Figure 6 shows a general side view of the dolly; and

Figure 7 shows a detail of the control handle.

Referring to Figure 1, the dolly includes a bifurcated chassis portion the side members 11 of which are pivotably connected at 12 (see also Figure 2) to second

chassis portion 13. The side members 11 carry road wheels 14; these are driven by an ~~electric motor~~ SPROCKET 15 via a sprocket 16, chain 17 and ~~gear wheel~~ 18. The electric motor is powered by a battery 19, which may be rechargeable via a battery charger and power supply socket 38 (Figure 6). The battery is located within housing 20 supported by handle 21 which is attached to the casing of axle 22 carrying road wheels 14A which in turn is pivotably attached about a vertical axis at 23 to the chassis portion 13, suitable stop means (not shown) being included to restrict the allowable extent of movement. Longitudinal bracing/wheel support members 24 are pivotably attached at 25 to the chassis portion 13; their other ends are supported by rollers 26 (see also Figures 3 and 4) on which the members 24 can slide. A pawl and ratchet arrangement (see Figure 5) and a release bar 27 (Figure 6) are associated with pivotable attachment point 25.

The side members 11 carry a cross member 28 which includes an aircraft wheel cradle consisting of side plates 29 and lateral tyre-support elements 30. A similar cradle consisting of cross member 31, side plates 32 and lateral tyre-support elements 33 is removably mountable between side members 11, in notches 34 formed therein.

The handle 21 is extendable (see Figure 6) for height- and leverage-adjustment and is securable in the retracted or extended position by means of a pin which is insertable when hole 35 formed in the outer sleeve portion is in registration with hole 36 or, for the extended position, a like similar hole (not visible in the drawings). A forward/reverse switch 37 is carried by the handle at the hand-grip (Figure 7).

In use and in order to prepare the dolly for use from the Figure 2 position to the Figure 3 position, the dolly is placed so that the side chassis members 11 lie on either side of an aircraft wheel 36. A downwards pressure is then exerted on the handle 21 and/or the release bar ~~25~~ 27 which has the effect of raising the pawl from engagement with the notch of the ratchet (Figure 5b), thereby allowing the handle to be raised so that the chassis portions tilt about their wheel axles to attain the Figure 3 position (also Figure 5a). The dolly is then moved so that the wheel is received in the fixed cradle between side plates 23 and the removable cradle is placed in position to support the tyre both fore and aft of the wheel axle. The handle may then be lowered (Figure 4) to raise the chassis portions and to cause the pawl, which is spring-loaded, automatically to re-engage the ratchet, whereby the members 11, the vertical members of chassis portion 33 and the bracing members 24 form a triangle the geometry of which is held rigid, thereby locking the dolly in the load-carrying position. The dolly is then movable by its electric motor, using the weight of the aircraft for traction, and is manually steerable from the handle 21. The aircraft wheel may be released by repeating the Figures 2-3 procedure as explained above.

The dolly may be adapted to any size or width of wheel or for various wheel configurations.

The pawl and ratchet mechanism may be replaced, for example, by a hydraulic cylinder acting between points X and Y (Figure 2).

Figures 8, 9, 10 & 11 show an alternative method of retaining an aircraft nosewheel 36, by means of a simple self-locking device.

It will be noted that wheel support members 24, are longer and without the notches 34 shown in figures 3 and 4.

Located securely to each end of cross-member 31 are two small plates 2, spaced parallel to each other and secured by two dowels 3. Figure 10.

Mounted securely on cross member 31 are side plates 4 and lateral tyre support elements 5.

Figure 11 shows a plan view of a nosewheel and bifurcated section of the machine and a section through A - A which clearly shows how the self-locking mechanism works.

The greater the downward acting force on lateral tyre support elements 5, the more torque is created about the axis at X, section A - A.

The removable tyre cradle consisting of cross member 31, side plates 4, lateral tyre support element 5, small plates 2 and dowels 3 is slidably adjusted on support members 24 so as to accommodate various nosewheel diameters.

Figure 8 shows a cut-away side view of the machine in folded position with an aircraft nosewheel in place, and removable wheel cradle (chock) ready to be located on wheel support members 24.

Figure 9 shows a cut-away side view of machine with removable wheel cradle (chock) located on wheel support members 24, and in position against nosewheel.

Figure 10 shows cut-away side view of machine in extended position with wheel support members 24 raised. Note: both removable wheel cradle (chock) and fixed wheel cradle assist in raising nosewheel.

Figure 11 shows a plan view of nosewheel and bifurcated section of machine and a section through A - A.

CLAIMS

1. A self-propelled dolly for the movement of aircraft, the dolly comprising a chassis supported by wheel means on two longitudinally-spaced axles, the chasses including aircraft wheel support means between the axles and the chassis being lowerable between the axles to a ground-contacting position for engagement and disengagement of an aircraft wheel, at least one wheel means being motor-drivable.

2. A dolly according to Claim 1, in which the chassis is constructed in two parts pivoted together about a horizontal axis between the axles and including releasable locking means to maintain the chassis in the raised position for load-carrying.

3. A dolly according to Claim 1 or Claim 2 comprising a pair of laterally-spaced apart first ground-engaging wheels each mounted about a portion of a split first axle on a bifurcated chassis portion, the wheels defining therebetween a space to receive an aircraft wheel; one or more second ground-engaging wheels mounted on a second chassis portion and pivotable about a substantially vertical axis to provide steering ability to the dolly, the second chassis portion including handle means extending therefrom for control of the dolly by an operator; a motor and drive means operatively connected to at least one of said ground-engaging wheels; pivot means pivotably connecting together at distal ends thereof with respect to and between said first and second ground-engaging wheels about a substantially horizontal axis said chassis portions, whereby said distal ends are lowerable and raisable with respect to the ground; means to support an aircraft wheel mounted on said

bifurcated chassis portion; and releasable locking means to maintain said distal ends in the raised position, in which an aircraft with a wheel thereof supported above ground level by the dolly may be manoeuvred.

4. A dolly according to any preceding claim, in which the wheel support means comprises a fixed wheel cradle mounted between bifurcated chassis sections which are placeable on either side of an aircraft wheel with the wheel on one side of the ground-contacting part in contact with the fixed cradle, and a movable cradle which may be located on the other side of the ground-contacting part whereby to support the wheel evenly about its central bearing.

5. A dolly according to any preceding claim, in which the aircraft wheel is retained by a self-locking device.

6. A self-propelled dolly, substantially as hereinbefore desribed with reference to and as illustrated in any of Figures 1 to 6 of the accompanying drawings.

7. A self-propelled dolly including a self-locking aircraft wheel device, substantially as hereinbefore described with reference to and as illustrated in any of Figures 8 to 11 of the accompanying drawings.

**Patents Act 1977**
**Examiner's report to the Comptroller under Section 17 (The Search Report)**

Application number

9102454.7

**Relevant Technical fields**

(i) UK Cl (Edition K ) B7H (HA)

(ii) Int Cl (Edition 5 ) B64F 1/22

Search Examiner

J L TWIN

**Databases** (see over)

(i) UK Patent Office

(ii)

Date of Search

13,16 DECEMBER 91

Documents considered relevant following a search in respect of claims

1

| Category (see over) | Identity of document and relevant passages | Relevant to claim(s) |
|---|---|---|
| A | GB 1105364 (MASLING) | 1 |
| A | GB 551605 (FORD) | 1 |
| A | US 3662911 (HARMAN) | 1 |

| Category | Identity of document and relevant passages | Relevant to claim(s) |
|---|---|---|
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